IN THE CLAIMS

1. (Currently Amended) A method ~~of~~ for structured document transcoding ~~a source structured document in a markup language into one or more ordered and hierarchically related structured data, each being suitable for a browser to render a display page while satisfying constraints from a display area and processing capacity of a browser device, the method comprises the steps of~~comprising:

generating a source document from an element of a structured document in a markup language, the source document replacing the element to update the structured document;

~~a)~~ building a document tree including a plurality of tree nodes associated with document elements from ~~said source structured document~~ the source document and the updated structured document;

~~b)~~ generating a plurality of new document trees from ~~said~~ the document tree such that ~~said~~ the plurality of new document trees are ordered and hierarchically linked, the new document trees being associated with new document elements;

~~c)~~ determining sizing parameters for one or more new tree nodes of ~~scaling sizing attributes of each tree node of said new document trees thereby satisfying said constraints for each~~at least one of ~~said~~the new document trees; and

~~d)~~ producing, from ~~each~~the at least one of the new document trees, one structured data such that it is suitable for input to ~~said~~ a browser in a browser to render in a browser device,

wherein the one or more new tree nodes including one root node and one or more leaf nodes, the determined sizing parameters of the root node satisfying constraints associated with a display area and processing capacity for the browser, each of the one or more new tree nodes except the root node having a single parent node belonging to the one or more new tree nodes and each of the one or more new tree nodes except the one or more leaf nodes having at least one child node belonging to one or more new tree nodes, and wherein each leaf node is associated with no more than one of the plurality of new document trees.

2. (Currently Amended) The method of claim 1 wherein the sizing parameters include minimum display width ~~each of said document trees further comprises only one root node and more than one leaf nodes, each saidnode except the root node has one and only one parent node and each said node except the leaf node has at least one child note~~.

3. (Canceled)

4. (Currently Amended) A method of transcoding a source structured document in a markup language for a browser to render while satisfying constraints from a display area and processing capacity of a browser device, the constraints including a plurality of layout constraints, the method comprises:

building a document tree from the source structured document;

~~The method of claim 3 wherein the step of b) further comprises one or more of the following steps:~~

assigning one or more layout constraints and sizing parameters to ~~each~~a plurality

of tree nodes of ~~said~~ the document tree;

splitting or partitioning an oversized tree node of the plurality of tree nodes ~~said document tree~~ into one or more new tree nodes of new document trees that ~~a plurality of newly added treenodes thereby making each of said newly added tree nodes~~ satisfy ~~a size~~ one of the plurality of layout constraints ~~or partitioning an oversized tree node of said document tree thereby adding a new document tree that satisfies a size constraint,~~ wherein the new document trees are hierarchically linked; and

ordering ~~said~~ the new document trees in an order consistent with a two-dimensional navigation sequence of ~~said~~ a display page for ~~said~~ the source structured document, wherein at least one new tree node of the new document trees including sizing attributes scalable to satisfy the constraints for at least one of the new document trees to produce one structured data such that it is suitable for input to the browser, wherein the at least one new document tree comprises one or more new tree nodes including one root node and one or more leaf nodes, each new tree node except the root node having a single parent node in the one or more new tree nodes, each of the one or more new tree nodes except the one or more leaf nodes having at least one child node in the one or more new tree nodes, and each leaf node belonging to no more than one of the new document trees.

5. (Currently Amended) The method of claim 4 wherein ~~said~~ the two-dimensional navigation sequence is top-to-down coupled with either left-to-right or right-to-left.

6. (Canceled)

7. (Canceled)

8. (Currently Amended) The method of claim 1~~6~~ wherein ~~said~~ the generating the source document comprises executing executable codes included in the element to provide dynamic document elements in the source document~~data element contains either a text content or script codes~~.

9. (Currently Amended) The method of claim ~~6~~ 8, wherein ~~each document element within~~the executable codes include script codes ~~the subset of said document element list is a layout element~~.

10. (Currently Amended) The method of claim ~~6~~ 9, wherein the ~~step of generating a document element list further comprises~~ executing is based on a document object model according to the structured document

~~parsing said source structured document into said document element list;~~

~~expanding additional structured document from a document element; and~~

~~inserting said additional structured document back into said source structured document~~.

11. (Currently Amended) The method of claim ~~10~~ 1, wherein the generating the source document comprises retrieving the source document based on a link data included in the

elementsteps of parsing, expanding, and inserting are iteratively invoked, one after another per iteration, until said source structured document is completely parsed.

12. (Canceled)

13. (Canceled)

14. (Currently Amended) The method of claim 13 11 wherein the step of fetching furtherretrieving comprises sending an HTTP request according to the link data and receiving an HTTP response.

15. (Currently Amended) The method of claim 13 11 wherein the step of fetching furtherretrieving comprises sending an HTTPS request according to the link data and receiving an HTTPS response.

16. (Currently Amended) The method of claim 13 11 wherein said documentthe element is associated with a FRAME element, or an IFRAME element or a SCRIPT element.

17. (Canceled)

18. (Currently Amended) The method of claim 4 wherein the step of partitioning further comprises the steps of

selecting a set of descendant nodes of said the second oversized tree node such that

eachat least one selected descendant node is belongs toassociated with at

least one of the one or more layout constraints assigned to ~~said~~ the second oversized tree node;

establishing a partition tree by copying or relocating corresponding tree nodes from ~~said~~ the document tree to ~~said~~ the partition tree such that

(i) ~~each~~at least one sub tree rooted at ~~any~~ one ~~tree node within~~of ~~said~~ the selected set of descendant nodes gets removed from ~~said~~ the document tree;

(ii) an ancestor tree node of ~~any tree node within~~the one of ~~said~~ the selected set of descendant nodes ~~wherein the ancestor tree node having~~ has more than one child nodes copied from ~~said~~ the document tree; and

(iii) ordering relationships among ~~the~~ tree nodes of ~~said~~ the partition tree is the same as that of the corresponding tree nodes in ~~said~~ the document tree; and

inserting cross linking nodes to ~~said~~ the partition tree and ~~said~~ the document tree ~~thereby~~ to create~~ing~~ a corresponding hierarchical linking relationship.

19. (Currently Amended) The method of claim 4 wherein ~~said~~ the ordering ~~step further~~ comprises inserting cross-linking nodes to ~~said~~ the new document trees ~~thereby~~ to cause~~ing~~ ~~each~~at least one of the ~~said~~ new document trees resulting from the ~~step of~~ partitioning to have references to its neighboring new document trees according to ~~said~~ the order.

20. (Currently Amended) The method of claim 1, ~~wherein the step of scaling~~ further comprising~~es the steps of~~:

assigning a target browser display width to the root node of the ~~each~~at least one ~~said~~ new document tree as a maximum width allowed for ~~said~~ the root node;

deciding a maximum width allowed for ~~each~~at least one ~~said~~ new tree node of the at least one new document tree given ~~the~~ a maximum width allowed for its single parent node such that ~~the value of said~~ a minimum width sizing parameter assigned to ~~said~~ the single parent node ~~is~~ has a value no greater than the given maximum width;

determining a scaling factor~~, no greater than 1,~~ for ~~each~~the at least one ~~said~~ new tree node; and

applying ~~said~~ the scaling factor to sizing attributes of ~~said~~ new document elements associated with ~~said~~ the at least one new tree node.

21-23. (Canceled)

24. (Currently Amended) The method of claim ~~6~~ 1 wherein the ~~step of completing~~ generating a plurality of new document trees ~~further~~ comprises ~~the step of~~ converting ~~said~~ at least one tree nodes to at least one new tree nodes associated with one or more new document elements, the one or more new document elements being ~~document element tree into a new document element tree, such that each tree node of said new document element tree is~~ associated with ~~a data element, a single markup element or two paired markup elements of~~ a second markup language.

25. (Currently Amended) The method of claim 1 wherein ~~said~~ the markup language is HTML.

26. (Currently Amended) The method of claim 24 wherein the~~said~~ second markup language is HTML, CHTML, XHTML, XML, WML or HDML.

27. (Currently Amended) The method of claim 26 wherein the ~~step of~~ converting converts ~~a~~ the one or more tree nodes associated with ~~paired~~ FRAMESET elements into ~~another~~ the one or more new tree nodes associated with ~~paired~~ TABLE elements.

28. (Currently Amended) The method of claim 26 wherein the ~~step of~~ converting converts the one or more~~a~~ tree nodes associated with ~~paired~~ FRAME elements into ~~another~~ the one or more new tree nodes associated with ~~paired~~ TD elements.

29. (Currently Amended) The method of claim 4 wherein ~~said~~ the one or more layout constraints assigned to ~~said~~ the plurality of tree nodes ~~is~~ include a vertical column or a horizontal row over a set of descendant nodes of ~~said~~ one of the plurality of tree nodes ~~and each said tree node is associated with one or more said layout constraints~~.

30. (Currently Amended) The method of claim 4 wherein ~~said~~ the sizing parameters comprises a scalable width, a minimum width, an image area and a character number.

31. (Currently Amended) The method of claim 4 wherein ~~the value of said~~ one of the sizing parameters assigned to ~~said~~ one of the plurality of tree nodes is ~~the~~ a cumulative summation of corresponding values of the same sizing parameter of ~~all~~ one or more of its child nodes.

32. (Currently Amended) The method of claim ~~4~~ 29 wherein ~~the~~ a value of ~~said~~ one of the sizing parameters ~~assigned to said tree node~~ is determined as a cumulative summation, over a set of the one or more layout constraints assigned to ~~said~~ the one of the plurality of tree nodes, of maximum corresponding value of the same sizing parameter within the set of descendant nodes ~~belonging to~~associated with the ~~same~~ set of the one or more layout constraints.

33. (Currently Amended) The method of claim 29 wherein one of the ~~value of said~~ sizing parameters assigned to ~~said~~ the one of the plurality of tree nodes has a value ~~is~~ no less than ~~any~~ at least one corresponding value of the same sizing parameter of ~~said~~ the set of descendant nodes ~~belonging to~~associated with ~~one said~~ the vertical column constraint ~~associated with said tree node~~.

34. (Currently Amended) The method of claim 29 wherein ~~the value~~ one of ~~said~~ the sizing parameters assigned to ~~said~~ the one or the plurality of tree nodes has a value ~~is~~ no less than a cumulative summation of ~~each~~at least one corresponding value of the same sizing parameter of ~~said~~ the set of descendant nodes ~~belonging to~~associated with ~~one said~~the horizontal row constraint ~~associated with said tree node~~.

35. (Currently Amended) The method of claim 30 wherein ~~said oversized tree node has a value of said~~ the minimum width sizing parameter of the oversized tree node has a value exceeding a width threshold value associated with the one of the plurality of layout constraints.

36. (Currently Amended) The method of claim 29 wherein ~~said~~ the splitting or partitioning ~~step~~ modifies ~~one~~ the horizontal row layout constraint assigned to ~~said~~ the oversized tree node.

37. (Currently Amended) The method of claim 1 wherein ~~said~~ the generating a plurality of new document trees ~~step further~~ comprises composing a catalog document tree, containing tree nodes linked to ~~said~~ the new document trees, to provide a summary sizing information for ~~each~~at least one ~~said~~ new document tree and the hierarchical linking relationship amongst ~~said~~ the new document trees.

38. (Currently Amended) The method of claim 1 wherein ~~said~~ the structured data is a structured document in a second markup language.

39. (Currently Amended) The method of claim 1 wherein ~~said~~ the browser device is palmtops, PDAs or data enabled cell phones wirelessly connected with a small display areas and processing capacities.

40. (Currently Amended) A computer readable medium encoded with a plurality of ~~including~~ computer-executable instructions which, when executed by a processing system ~~for transcoding a source structured document in a markup language into one or more ordered and hierarchically related structured data, each being suitable for a browser to render a display page while satisfying constraints from a display area and processing~~

~~capacity of a browser device,~~ causes the processing system to perform a method for structured document transcoding, the ~~instructions~~method comprisingses~~s~~:

generating a source document from an element of a structured document in a markup language, the source document replacing the element to update the structured document;

~~a)~~ building a document tree including a plurality of tree nodes associated with document elements from the source document and the updated structured document, ~~from said source structured document~~;

~~b)~~ generating a plurality of new document trees from ~~said~~ the document tree such that ~~said~~ the plurality of new document trees are ordered and hierarchically linked;

~~c)~~ determining sizing parameters for one or more new tree nodes of ~~scaling sizing attributes of each tree node of said new document trees thereby satisfying said constraints for each~~at least one of the new document trees; and

~~d)~~ producing, from the ~~each~~ at least one new document trees, one structured data such that it is suitable for input to ~~said~~ a browser to render in a browser device,

wherein the one or more new tree nodes including one root node and one or more leaf nodes, the determined sizing parameters of the root node satisfying constraints associated with a display area and processing capacity for the browser, each of the one or more new tree nodes except the root node having a single parent node belonging to the one or more new tree nodes and each of the one or more new tree nodes except the one or more leaf nodes having at least one child node belonging to one or more new tree nodes, and wherein each leaf node is associated with no more than one of the plurality of new document trees.

41. (Currently Amended) The computer readable medium of claim 40 wherein the sizing parameters include minimum display width~~each of said document tree further comprises only one root node and more than one leaf nodes, each said nodes except the root node has one and only one parent node and said node except the leaf node has at least one child note~~.

42. (Canceled)

43. (Currently Amended) A computer readable medium encoded with a plurality of computer-executable instructions which, when executed by a processing system, causes a data processing system to perform a method for transcoding a source structured document in a markup language for a browser to render a display page while satisfying constraints from a display area and processing capacity of a browser device, the constraints including a plurality of layout constraints, the method comprising:

building a document tree from the source structured document;

~~The computer readable medium of claim 42 wherein the step b) further comprises one or more of the following steps:~~

assigning one or more layout constraints and sizing parameters to ~~each~~ a plurality of tree nodes of ~~said~~ the document tree;

splitting or partitioning an oversized tree node of the plurality of tree nodes ~~said document tree~~ into one or more new tree nodes of new document trees that a ~~plurality of newly added tree nodes thereby making each~~ of ~~said newly added~~ tree nodes satisfy one of the plurality of layout constraints ~~a size constraint orpartitioning an oversized tree node of said document tree~~

~~thereby~~ ~~adding a new document tree that satisfies a size constraint~~, wherein the new document trees are hierarchically linked; and

ordering ~~said~~ the new document trees in an order consistent with a two-dimensional navigation sequence of ~~said~~ a display page for ~~said~~ the source structured document, wherein at least one new tree node of the new document trees including sizing attributes scalable to satisfy the constraints for at least one of the new document trees to produce one structured data such that it is suitable for input to the browser, wherein the at least one new document tree comprises one or more tree nodes including one root node and more leaf nodes, each new tree node except the root node having a single parent node in the one or more new tree nodes, each of the one or more new tree nodes except the one or more leaf nodes having at least one child node in the one or more new tree nodes, and each leaf node belonging to no more than one of the new document trees.

44. (Canceled)

45. (Currently Amended) The computer readable medium of claim ~~44~~ 40, wherein the generating the source document comprises executing executable codes included in the element to provide dynamic document elements in the source document~~step the of generating a document element list further comprises~~

~~parsing said source structured document into said document element list;~~

~~expanding additional structured document from a document element; and~~

~~inserting said additional structured document back into said source structured~~

~~document~~.

46. (Currently Amended) The computer readable medium of claim ~~45~~ 40, wherein the generating the source document comprises retrieving the source document based on a link data included in the element~~steps of parsing, expanding, and inserting are iteratively invoked, one after another per iteration, until said source structured document is completely parsed~~.

47. (Currently Amended) The computer readable medium of claim 43 wherein the ~~step of~~ partitioning ~~further~~ comprises ~~the steps of~~

selecting a set of descendant nodes of ~~said~~ the second oversized tree node such that ~~each~~at least one selected descendant node ~~belongs to~~is associated with at least one of the one or more layout constraints assigned to ~~said~~ the second oversized tree node;

establishing a partition tree by copying or relocating corresponding tree nodes from ~~said~~ the document tree to ~~said~~ the partition tree such that

(i) ~~each~~at least one sub tree rooted at ~~any~~ one of ~~tree node within~~ ~~said~~ the selected set of descendant nodes gets removed from ~~said~~ the document tree;

(ii) an ancestor tree node of ~~any tree node within~~ the one of ~~said~~ the selected set of descendant nodes ~~wherein the ancestor tree node having~~ has more than one child nodes copied from ~~said~~ the document tree; and

(iii) ordering relationships among ~~the~~ tree nodes of ~~said~~ the partition

tree is the same as that of ~~said~~ the corresponding tree nodes in the document tree; and

inserting cross linking nodes to ~~said~~ the partition tree and ~~said~~ the document tree ~~thereby~~ to ~~creating~~ create a corresponding hierarchical linking relationship.

48. (Currently Amended) The computer readable medium of claim ~~40~~ 41 ~~wherein the~~ further ~~step of scaling further~~ comprisinges ~~the steps of~~ :

assigning a target browser display width to the root node of ~~each~~at least one ~~said~~ the new document tree as a maximum width allowed for ~~said~~ the root node;

deciding a maximum width allowed for ~~each~~at least one ~~said~~ new tree node of the at least one new document tree given ~~the~~ a maximum width allowed for its single parent node such that ~~the value of~~ ~~said~~ a minimum width sizing parameter assigned to ~~said~~ the single parent node ~~is~~ has a value no greater than the given maximum width;

determining a scaling factor~~, no greater than 1,~~ for ~~each~~ ~~said~~ the at least one new tree node; and

applying ~~said~~ the scaling factor to sizing attributes of ~~said~~ new document elements associated with ~~said~~ the at least one new tree node.

49. (Currently Amended) The computer readable medium of claim ~~44~~ 40 wherein ~~the step of completing~~ the generating a plurality of new document trees ~~further~~ comprises ~~the step of~~ converting ~~said~~ at least one tree nodes to at least one new tree nodes associated with one or more new document elements, the one or more new document elements ~~document element tree into a new document element tree, such that each tree node of said new~~

~~document element tree is~~ being associated with ~~a data element, a single markup element or two paired markup elements of~~ a second markup language.

50. (Currently Amended) The computer readable medium of claim 40 wherein ~~said~~ the markup language is HTML.

51. (Currently Amended) The computer readable medium of claim 49 wherein ~~said~~ the second markup language is HTML, CHTML, XHTML, XML, WML or HDML.

52. (Currently Amended) The computer readable medium of claim 43 wherein ~~said~~ the one or more layout constraints assigned to ~~said~~ the plurality of tree nodes ~~is~~ include a vertical column or a horizontal row over a set of descendant nodes of ~~said~~ one of the the plurality of tree nodes ~~and each said tree node is associated with one or more said layout constraints~~.

53. (Currently Amended) The computer readable medium of claim 43 wherein ~~said~~ the sizing parameters comprises a scalable width, a minimum width, an image area and a character number.

54. (Currently Amended) The computer readable medium of claim 43 wherein one of the ~~value of said~~ sizing parameters assigned to ~~said~~ one of the plurality of tree nodes is ~~the~~ a cumulative summation of corresponding values of the same sizing parameter of ~~all~~ one or more of its child nodes.

55. (Currently Amended) The computer readable medium of claim ~~43~~ 52 wherein a ~~the~~ value of ~~said~~ the one of the sizing parameters ~~assigned to said tree node~~ is determined as a cumulative summation, over a set of the one or more layout constraints assigned to ~~said~~ the one of the plurality of tree nodes, of maximum corresponding value of the same sizing parameter within the set of descendant nodes ~~belonging to~~associated with the set of the ~~same~~ one or more layout constraints.

56. (Currently Amended) The computer readable medium of claim 52 wherein ~~the value~~one of ~~said~~ the sizing parameters assigned to ~~said~~ the one of the plurality of tree nodes has a value ~~is~~ no less than ~~any~~ at least one corresponding value of the same sizing parameter of ~~said~~ the set of descendant nodes ~~belonging~~ associated with ~~to one said~~the vertical column constraint ~~associated with~~ said ~~tree node~~.

57. (Currently Amended) The computer readable medium of claim 52 wherein one of the ~~value of said~~ sizing parameters assigned to ~~said~~ the one of the plurality of tree nodes has a value ~~is~~ no less than a cumulative summation of ~~each~~ at least one corresponding value of the same sizing parameter of ~~said~~ the set of descendant nodes ~~belonging to~~associated with ~~one said~~the horizontal row constraint ~~associated with said tree node~~.

58. (Currently Amended) The computer readable medium of claim 53 wherein ~~said oversized tree node has a value of said~~ the minimum width sizing parameter of the oversized tree node has a value exceeding a width threshold value associated with the one of the plurality of layout constraints .

59. (Currently Amended) The computer readable medium of claim 52 wherein ~~said~~ the splitting or partitioning ~~step~~ modifies ~~one~~ the horizontal row layout constraint assigned to ~~said~~ the oversized tree node.

60. (Currently Amended) The computer readable medium of claim 40 wherein ~~said~~ the generating a plurality of new document trees ~~step further~~ comprises composing a catalog document tree, containing tree nodes linked to ~~said~~ the new document trees, to provide a summary sizing information for ~~each~~at least one ~~said~~ new document tree and the hierarchical linking relationship amongst ~~said~~ the new document trees.

61. (Currently Amended) The computer readable medium of claim 40 wherein ~~said~~ the structured data is a structured document in a second markup language.

62. (Currently Amended) The computer readable medium of claim 40 wherein ~~said~~ the browser device is palmtops, PDAs or data-enabled cell phones wirelessly connected with a small display areas and processing capacities.

63. (New) The method of claim 1, wherein the document elements has an order according to the source document and the updated structured document, wherein the new document elements are ordered according to the order, and wherein the new document trees are ordered based on an order of the new document elements.

64. (New) The method of claim 63, wherein the new document trees include a first new document tree and a second new document tree, the first new document tree having a first

new document tree node associated with first new document elements converted from first document elements of the document elements, the second new document tree having a second new document tree node associated with second new document elements converted from second document elements of the document elements, and wherein the order of the new document tree between the first new document tree and the second new document tree is based on the order of document elements between the first document elements and the second document elements. .

65. (New) The method of claim 64, wherein the first new document tree includes a new tree node associated with a hyperlink element linking the second new document tree.

66. (New) The method of claim 65, wherein the hyperlink element includes an order indicator indicating an order of the second new document tree within the ordered new document trees.

67. (New) The method of claim 65, wherein the hyperlink element includes a hierarchical indicator indicating a relative level of hierarchy between the first new document tree and the second new document tree within the hierarchically linked new document trees.

68. (New) The computer readable medium of claim 40, wherein the document elements has an order according to the source document and the updated structured document, wherein the new document elements are ordered according to the order, and wherein the new document trees are ordered based on an order of the new document elements.

69. (New) The computer readable medium of claim 68, wherein the new document trees include a first new document tree and a second new document tree, the first new document tree having a first new document tree node associated with first new document elements converted from first document elements of the document elements, the second new document tree having a second new document tree node associated with second new document elements converted from second document elements of the document elements, and wherein the order of the new document tree between the first new document tree and the second new document tree is based on the order of document elements between the first document elements and the second document elements. .

70. (New) The computer readable medium of claim 69, wherein the first new document tree includes a new tree node associated with a hyperlink element linking the second new document tree.

71. (New) The computer readable medium of claim 70, wherein the hyperlink element includes an order indicator indicating an order of the second new document tree within the ordered new document trees.

72. (New) The computer readable medium of claim 70, wherein the hyperlink element includes a hierarchical indicator indicating a relative level of hierarchy between the first new document tree and the second new document tree within the hierarchically linked new document trees.

73. (New) An apparatus for structured document transcoding, comprising:

means for generating a source document from an element of a structured document in a markup language, the source document replacing the element to update the structured document;

means for building a document tree including a plurality of tree nodes associated with document elements from the source document and the updated structured document;

means for generating a plurality of new document trees from the document tree such that the plurality of new document trees are ordered and hierarchically linked;

means for determining sizing parameters for one or more new tree nodes of at least one of the new document trees; and

means for producing, from the at least one of the new document trees, one structured data such that it is suitable for input to a browser to render in a browser device,

wherein the one or more new tree nodes including one root node and one or more leaf nodes, the determined sizing parameters of the root node satisfying constraints associated with a display area and processing capacity for the browser, each of the one or more new tree nodes except the root node having a single parent node belonging to the one or more new tree nodes and each of the one or more new tree nodes except the one or more leaf nodes having at least one child node belonging to one or more new tree nodes, and wherein each leaf node is associated with no more than one of the plurality of new document trees.